

# 1 COMPACT WATER FILTER FOR CLEANING POOL WATER

## 2 BACKGROUND OF THE INVENTION

### 3 1. Field of the Invention

4 The present invention relates to a compact water filter, and more  
5 particularly to a compact water filter for cleaning pool water, such as recycling  
6 dirty swimming pool water.

### 7 2. Description of Related Art

8 A swimming pool typically uses a water filtration system to clean pool  
9 water so that contaminated water in the pool can be recycled to save water.  
10 However, water filtration systems are generally very large and have a complex  
11 structure. Therefore, large water filtration systems are expensive and are  
12 typically used for public or institutional swimming pools.

13 Private or backyard swimming pools are generally much smaller than  
14 public or institution swimming pools. Large water filtration systems are not  
15 economic for such small swimming pools. A compact water filter is suitable for a  
16 small swimming pool to clean the pool water so the pool water can be recycled to  
17 save water.

18 With reference to Figs. 4 and 5, a conventional compact water filter in  
19 accordance with prior art comprises a mounting housing (30), a cap (33), a filter  
20 (41) and a water pump assembly (not numbered). The mounting housing (30) has  
21 a top (not numbered), a bottom (not numbered), a top cavity (301), a bottom  
22 cavity (302), a mounting lip (303) and a water inlet (304). The top cavity (301) is  
23 defined in the top and has a bottom (not numbered). The bottom of the top cavity  
24 (301) has a center (not numbered), an annular rib (306) and a through hole (305).

1 The annular rib (306) is integrally formed at the center of the bottom. The  
2 through hole (305) is defined through the bottom in the annular rib (306) to allow  
3 the top cavity (301) to communicate with the bottom cavity (302). The bottom  
4 cavity (302) is defined in the bottom of the mounting housing (30). The  
5 mounting lip (303) protrudes radially at the bottom of the mounting housing (30)  
6 and has multiple mounting holes (307). The water inlet (304) communicates with  
7 the top cavity (301) to allow contaminated pool water to enter the top cavity  
8 (301).

9 The filter (41) is partially mounted in the top cavity (301) around the  
10 annular rib (306) to remove contaminant from the incoming water. The cap (33)  
11 is attached to the top of the mounting housing (30), covers the top cavity (301)  
12 and has a bottom cavity (331) that holds the filter (41).

13 The water pump assembly is mounted in the bottom cavity (302) and  
14 comprises a water pump (40), a U-shaped clamp (42) and a threaded seal (43).  
15 The pump (40) has a water inlet (401) and a water outlet (402). The water inlet  
16 (401) is mounted and held in the through hole (305) and has a top end (not  
17 numbered) extending out of the through hole (305). The water outlet (402)  
18 laterally extends out of the mounting housing (30). The clamp (42) firmly holds  
19 the pump (40) in place in the bottom cavity (302). The threaded seal (43) screws  
20 on the extended top end of the water inlet (401) to prevent water from leaking  
21 through the though hole (305).

22 When the pump (40) is started, the pool water is sucked into the top  
23 cavity (301) of the mounting housing (30) and the bottom cavity (331) of the cap  
24 (33) through the water inlet (304). Incoming water passes through the filter (41)

1 to remove contaminants from the water and enters into the pump (40) through  
2 the water inlet (401). The pump (40) pumps the clean water out of the water filter  
3 through the water outlet (402) to the pool to recycle the pool water.

4 Since most of the pool water in the water filter is in the top cavity (301)  
5 of the mounting housings (30) and the bottom cavity (331) of the cap (33), the  
6 center of gravity of the water filter is high, and the water filter must be held in  
7 place with fasteners (not shown) to keep the water filter from overturning.

8 Therefore, this kind of water filter needs to be attached to a stationary base (not  
9 shown) with fasteners such as bolts. The conventional compact water filter is  
10 inconvenient to use because the water filter is not easy to move after the water  
11 filter is mounted. A long suction hose must be connected to the fixed water filter  
12 to reach all areas of the pool. If the suction hose is too long, the pool water cannot  
13 be efficiently drawn into the water filter because the power of the pump (40) is  
14 limited. The water filter cannot completely clean the pool water.

15 To overcome the shortcomings, the present invention provides an  
16 improved compact water filter to mitigate or obviate the aforementioned  
17 problems.

## 18 SUMMARY OF THE INVENTION

19 The main objective of the invention is to provide a compact water filter  
20 that does not have to be attached to a given position so the water filter can be  
21 moved conveniently to any position around a pool to clean pool water.

22 A compact water filter includes a housing, a filter and a water pump. The  
23 housing includes a bottom container, a pump casing and a packing ring. The  
24 bottom container has a top cavity and a water inlet communicating with the top

1 cavity. The pump casing is mounted on the bottom container to cover the top  
2 cavity and has a water discharge port. The packing ring fastens the bottom  
3 container and the pump casing together. The filter is mounted and held in the top  
4 cavity of the bottom container to remove contaminants from the water coming  
5 through the water inlet. The water pump is mounted in the housing to suck the  
6 water through the water inlet and pump the clean water out of the water filter  
7 through the water discharge port. Consequently, most of the pool water in the  
8 water filter is in the bottom container, which lowers the center of gravity of the  
9 water filter. The water filter will be stable and does not need to be attached to a  
10 surface to keep the water filter from overturning when the water filter is  
11 operating.

12 Other objectives, advantages and novel features of the invention will  
13 become more apparent from the following detailed description when taken in  
14 conjunction with the accompanying drawings.

#### 15 BRIEF DESCRIPTION OF THE DRAWINGS

16 Fig. 1 is an exploded perspective view of a compact water filter in  
17 accordance with the present invention;

18 Fig. 2 is a perspective view of the compact water filter in Fig. 1;

19 Fig. 3 is a perspective view in partial section of the compact water filter  
20 in Fig. 2;

21 Fig. 4 is a perspective view of a conventional compact water filter in  
22 accordance with prior art; and

23 Fig. 5 is a side plan view in partial section of the compact water filter in  
24 Fig. 4.

## DETAILED DESCRIPTION OF PREFERRED EMBODIMENT

With reference to Figs. 1, 2 and 3, a compact water filter in accordance with the present invention comprises a housing (not numbered), a filter (20) and a water pump (not numbered).

The housing comprises a bottom container (10), a pump casing (11), a packing ring (13) and a cap (12). The bottom container (10) has a top (not numbered), a top cavity (101), an exterior thread (102) and a water inlet (103). The top cavity (101) is defined in the top. The exterior thread (102) is formed around the top. The water inlet (103) communicates with the top cavity (101) to allow pool water to enter the bottom container (10).

The pump casing (11) is mounted around the top of the bottom container (10) to cover the top cavity (101) and comprises a volute (111) and top casing (112). The volute (111) covers the top cavity (101) and has a top (not numbered), a bottom (not numbered) and an annular lip (113). The bottom has an outer edge (not numbered). The annular lip (113) is formed radially along the outer edge. The top casing (112) protrudes from the top of the volute (111) and has a top driver chamber (114), a bottom impeller chamber (115) and a water discharge port (116). The top driver chamber (114) is isolated from the bottom impeller chamber (115). The water discharge port (116) communicates with the impeller chamber (115).

The packing ring (13) is mounted around the top of the bottom container (10) and has an interior thread (not numbered). The interior thread screws onto the exterior thread (102) on the bottom container (10) and simultaneously clamps the annular lip (113) of the volute (111) to fasten the bottom container (10)

1 to the pump casing (11). The cap (12) covers and closes the top driver chamber  
2 (114).

3 The filter (20) is mounted and held in the top cavity (101) of the bottom  
4 container (10) and has a top (not numbered) and an axial hole (201).

5 The water pump is mounted in the pump casing (11) of the housing and  
6 comprises a driver (21), an impeller (22) and an impeller holder (23). The driver  
7 (21) is mounted in the top driver chamber (114) and has two driver field  
8 windings (211). The driver field windings (211) are mounted around the isolated  
9 bottom impeller chamber (115) in the top driver chamber (114).

10 The impeller holder (23) is attached to the top of the filter (20) and has  
11 an annular bottom rib (231) and a top cap (232). The annular bottom rib (231)  
12 extends into and is held in the axial hole (201) of the filter (20) to hold the  
13 impeller holder (23) in place. The top cap (232) is formed coaxially with the  
14 annular bottom rib (231) and has a top (not numbered) and an inward protrusion  
15 (233). The inward protrusion (233) protrudes inside the top cap (232) from the  
16 top and has a volute inlet (234) that communicates with the axial hole (201) in  
17 the filter (20).

18 The impeller (22) is rotatably mounted in the bottom impeller chamber  
19 (115) and comprises a vertical shaft (221) and multiple vanes (222). The vertical  
20 shaft (221) is rotatably mounted in the bottom impeller chamber (115) and has a  
21 bottom end (not numbered). The bottom end extends into and is held in the  
22 volute inlet (234). The vanes (222) are attached to the bottom end of the vertical  
23 shaft (221) above the volute inlet (234) to pump the clean water into the water  
24 discharge port (116) from the volute inlet (234) as the vertical shaft (221) rotates.

1           The pool water in the bottom container (10) of the water filter lowers the  
2 center of gravity of the water filter. Consequently, the water filter is stable, does  
3 not need to be attached to a stationary object and does not overturn easily when  
4 the water filter is operating. The water filter can be moved easily and  
5 conveniently to any position around the pool to clean the pool water, which  
6 means a long suction hose is unnecessary. The pump assembly effectively sucks  
7 the pool water into the water filter to clean the pool water.

8           Even though numerous characteristics and advantages of the present  
9 invention have been set forth in the foregoing description, together with details  
10 of the structure and function of the invention, the disclosure is illustrative only,  
11 and changes may be made in detail, especially in matters of shape, size, and  
12 arrangement of parts within the scope of the appended claims.